UTILITY PATENT APPLICATION TRANSMITTAL (for new nonprovisional applications under 37 CFR 1 53(b))	Attorney Docket No.	113444	Total Pages	25
	First Named Inventor or Application Identifier			
	William Patrick Coan			
	Express Mail Label No.	EM365589655US		

APPLICATION ELEMENTS
See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: Assistant Commissioner for Patents
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1. ☒ Fee Transmittal Form
(submit an original, and a duplicate for fee processing)

2. ☒ Specification [Total Pages 13]
(preferred arrangement set forth below)
- Descriptive title of invention
- Cross References to Related Applications
- Statement Regarding Fed sponsored R&D
- Reference to Microfiche Appendix
- Background of the Invention
- Brief Summary of the Invention
- Brief Description of the Drawings(if filed)
- Detailed Description
- Claim(s)
- Abstract of the Disclosure

3. ☒ Drawing(s)(35 USC 113) [Total Sheets 3]

4. Oath or Declaration [Total Pages 3]
   a. ☒ Newly executed (original or copy)
   b. ☐ Copy from a prior application(37 CFR 1 63(d))
   (for continuation/divisional with Box 17 completed)
   [Note Box 5 below]
   i. ☐ DELETION OF INVENTOR(S)
   Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 163(d)(2) and 1.33(b)

5. ☐ Incorporation by reference(useable if Box 4b is checked)
The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference herein.

6. ☐ Microfiche Computer Program (Appendix)
7. ☐ Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary)
   a. ☐ Computer Readable Copy
   b. ☐ Paper Copy(identical to computer copy)
   c. ☐ Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

8. ☒ Assignment Papers(cover sheet & document(s))
9. ☐ 37 CFR 3.73(b)Statement ☐ Power of Attorney
10. ☐ English Translation Document (if applicable)
11. ☐ Information Disclosure ☐ Copies of IDS
    Statement(IDS)/PTO-1449 Citations
12. ☐ Preliminary Amendment
13. ☒ Return Receipt Postcard (MPEP 503)
    (Should be specifically itemized)
14. ☐ Small Entity ☐ Statement filed in prior application,
    Statement(s) Status still proper and desired
15. ☐ Certified Copy of Priority Document(s)
    (if foreign priority is claimed)
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17. If a CONTINUING APPLICATION, check appropriate box and supply the requisite information:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior Application No:
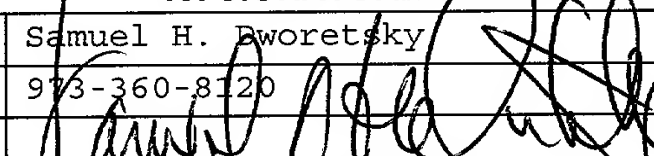
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"Express Mail" Mailing Label Number   EM365589655US   Date of Deposit 6/17/99

I hereby certify that this application is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Assistant Commissioner for Patents, Washington D.C. , 20231

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(Signature of Person Mailing Paper)

SYSTEM AND METHOD FOR OUTBOX-CAPABLE WIRELESS TRANSMISSION

FIELD OF THE INVENTION

The present invention relates to wireless communication. In particular, the present invention relates to systems and methods for providing interaction by non-latency-dependent and carrier-controlled applications.

5 BACKGROUND

Mobile systems exist that allow for both voice communication (e.g., a mobile telephone) and general data transfer (e.g., mobile Internet Protocol). In addition, cellular radio communications systems provide paging/access, or control, channels for carrying call-setup messages between base stations and mobile stations. These functions can be combined in a single device, but must be functionally separated to take maximal advantage of all functions. This is because TDMA cellular traffic operates in a buffer and burst, or discontinuous-transmission, mode. That is, each mobile station transmits and receives only during its assigned time slots. At full rate, for example, a mobile station might transmit during slot 1, receive during slot 2, idle during slot 3, transmit during slot 4, receive during slot 5, and idle during slot 6, and then repeat the cycle during succeeding TDMA frames. Thus, while a mobile system is carrying voice data over a traffic channel, data can be sent in either direction.

One defining feature of all prior art systems is that the prior art systems contain, on the one hand, traffic channels to carry traffic data, and on the other hand, overhead channels dedicated to the functional aspects of a mobile-station to base-station interaction. For example, hand shaking occurs over these overhead channels. Because of bandwidth and other functional constraints, no traffic data is saved over the overhead channels, also known as digital control channels (DCCH). For example, general browsing is conducted over a wireless Internet protocol (IP) session, at which time the device essentially is dedicated to data service.

Much of the traffic data carried by the mobile system is very short-burst data such as e-mail. Because this data can be transmitted in a relatively short burst, however, the time typically taken by the mobile system to set up a communication channel to transmit the burst is greater than the duration of the burst. This inefficiency, based on the short duration of the burst, is rampant among these types of systems. It is possible to use the DCCH for this sort of short-burst data, but in the IS-136 TDMA environment, the use of an IS-136 digital control channel (DCCH) for interactive data services presents several problems. First, the latency of the channel is unacceptable for general network-browsing functionality, and second, the use of the DCCH for this purpose could impact the quality of the voice service provided by the network. Thus, any use of the DCCH must be limited to use by short-burst data that can tolerate a high-latency connection.

Thus, it is desirable to queue application-service requests in the background of general wireless use, over the DCCH, without the invocation of a full wireless IP session that would allow the operation of functions without forcing the user into the browser mode of the device.

SUMMARY OF THE INVENTION

To alleviate the problems inherent in the prior art, systems and methods are introduced to provide wireless communication to a network.

In one embodiment of the present invention, non-latency dependent data is received for transmission to a base station. If the data is not appropriate for transmission over a digital control channel, the data is transmitted over a traffic channel. If the data is appropriate for transmission over the digital control channel, it is determined whether network conditions are favorable for transmission over the digital control channel. If network conditions are favorable for transmission over the digital control channel, the data is transmitted by the digital control channel to the base station. If network conditions are not favorable for transmission over the digital control channel, the data is queued for future transmission. The network is then monitored and the data is sent when it is determined that network conditions are favorable for transmission over the digital control channel.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a system overview of an embodiment of the present invention, featuring a mobile station and a base station.

Figure 2 is a flow chart of an embodiment of the present invention.

5   Figure 3 is a block diagram of an embodiment of the present invention featuring a processor and a memory.

DETAILED DESCRIPTION

The present invention relates to wireless communication for non-latency-dependent data that is transmitted over a digital control channel, thereby providing near-seamless operation between idle, voice and interactive modes.

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Figure 1 is an overview of an embodiment of the present invention featuring mobile station 101 and base station 102. Mobile station 101 in this embodiment contains transceiver 101a, data preprocessor 101b, memory 101c, and controller 101d. Transceiver 101a receives data from base station 102 and transmits data to base station 102. Data preprocessor 101b preprocesses the data for transmission. Memory 101c can store data and application instructions. Controller 101d can control the functions of mobile station 101, and process the instructions stored in memory 101c. The processing can include manipulating, transmitting, and displaying data stored in memory 101c.

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In particular, memory 101c can store instructions adapted to be executed by controller 101d to determine whether data is appropriate for transmission over a digital control channel, determine whether network conditions are favorable for transmission over a digital control channel, and instruct transceiver 101a to transmit data either over a traffic channel or a digital control channel. If network conditions are not favorable for transmission, the data to be transmitted can be buffered in memory 101c in a queue waiting for future transmission.

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A user can interact with the data stored in memory 101c via a graphical user interface (GUI). This GUI can be used to alert the user that mobile station 101 has received data, or is ready to transmit data. Additionally, this GUI can display the user's prioritization and timing

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information with regard to the data. Operations on the data, such as reading the data, deleting the data, etc., can be performed by operating on the contents of the GUI. All incoming and outgoing information can be posted and displayed in the GUI, and can be accessible from any operating mode of the mobile station. In other words, the user can have access to the data from either operating mode (voice or data).

In one embodiment of the present invention, base station 102 is capable of determining whether the data received from mobile station 101 via the digital control channel is application information rather than control information. In another embodiment of the present invention, base station 102 can be connected to a gateway (not shown) that is capable of determining whether application data is appropriate for transmission to mobile station 101 via a digital control channel.

Figure 2 is a flow chart of an embodiment of the present invention. At step 201, data is received for transmission to a base station. At step 202, it is determined whether the data is appropriate for transmission over a digital control channel. This determination is based on the size of the data to be transmitted, and how much the data depends on the connection's latency. In one embodiment of the present invention, this determination is based on at least an upper limit on the size of the data to be sent. This determination can be performed by an application stored in memory 101c. For example, an application stored in memory 101c can store instructions that place an upper limit on the size of data that it will send via the digital control channel. If the amount of data is less than that upper limit, controller 101d will accept the data for transmission via the digital control channel.

As another example, an application stored in memory 101c can determine whether the data to be sent is non-latency-dependent data such as e-mail If the data is non-latency-dependent, the data can be tagged as such so that it can be transmitted via the digital control channel. Examples of data appropriate for sending over the digital control channel include, but are not limited to, e-mail messages, pages, personal-organizer updates, stock quotes, e-commerce, sports scores, news headlines, or any Internet content.

If the data is too large to be transmitted over the digital control channel, then at step 204 the data is transmitted over a traffic channel. If the data is appropriate for transmission over a digital control channel, then at step 205 it is determined whether network conditions are favorable for transmission over the digital control channel.

In one embodiment of the present invention, mobile station 101 can monitor the network to determine whether there is sufficient bandwidth or there are slots available within the digital control channel for transmission. In another embodiment of the present invention, the mobile station can check to see if there is a channel available for transmitting a message prior to submitting the message for transmission. This can be performed by lower-layer (e.g., device layer) functions that monitor for channel availability. This lower-layer function can be, for example, but not the only example, the same voice-specific function used by a mobile terminal to acknowledge telephone pages. Thus, the data is transmitted from or delivered to mobile station 101 when the data-delivery system has locked on to the DCCH, and a free time slot is found into which the data can be inserted.

In one embodiment of the present invention, the mobile station can make a delivery request to a data-delivery subsystem. The subsystem can either respond by positively acknowledging the request indicating that the mobile terminal is on and a channel is found, or by a negative acknowledgment indicating that the mobile terminal is off, out of radio coverage, out of DCCH coverage, or that no channel is available.

If network conditions are favorable for transmission over a digital control channel, then at step 206 the data is transmitted via the digital control channel to the base station. If network conditions are not favorable for transmission over the digital control channel, then at step 207 the data is queued for future transmission.

In one embodiment the present invention, the data is prioritized before it is placed in the queue for transmission. In another embodiment of the present invention, the data is queued for future transmission at some predetermined time.

In general, all applications that have the ability to take advantage of this invention can use pre-fetch techniques to store the appropriate information required to manage the desired

functionality and can use the DCCH to fetch information that is not contained within the mobile station's memory.

Because the memory storing the data for transmission exists independent of connection to any data-transmission channel, requests to the Outbox can be posted at any time, regardless of 5 the cellular status (e.g., when the phone is an area with no service coverage).

Figure 3 is a block diagram of an apparatus according to an embodiment of the present invention. The apparatus contains processor 301 and memory 302. Memory 302 stores instructions adapted to be executed by processor 301 to perform any method embodiment of the present invention. For example, memory 302 stores instructions adapted to be executed by 10 processor 301 to receive data for transmission to a base station; to determine whether the data is appropriate for transmission over a digital control channel; if the data is appropriate for transmission over a digital control channel, to determine whether network conditions are favorable for transmission over a digital control channel; and if network conditions are favorable, to transmit the data over a digital control channel to the base station.

For the purposes of this application, memory includes any medium capable of storing instructions adapted to be executed by a processor. Some examples of such media include, but are not limited to, RAM, ROM, floppy disks, CDROM, magnetic tape, hard drives, optical storage units, and any other device that can store digital information. In one embodiment, the instructions are stored on the medium in a compressed and/or encrypted format. As used herein, 20 the phrase "adapted to be executed by a processor" is meant to encompass instructions stored in a compressed and/or encrypted format, as well as instructions that have to be compiled or installed by an installer before being executed by the processor.

The present invention has been described in terms of several embodiments solely for the purpose of illustration. Persons skilled in the art will recognize from this description that the 25 invention is not limited to the embodiments described, but may be practiced with modifications and alterations limited only by the spirit and scope of the appended claims.

WHAT IS CLAIMED IS:

1. 1. A method for wireless communication for non-latency-dependent data, the method
2. comprising:
3.   (a)   receiving data for transmission to a base station;
4.   (b)   determining whether the data is appropriate for transmission over a digital control
5.   channel; and
6.   (c)   if the data is not appropriate for transmission over a digital control channel,
7.   transmitting the data over a traffic channel.

1. 2. The method of claim 1, wherein said determining includes determining whether the data
2. is less than a predetermined size.

1. 3. A method for wireless communication for non-latency-dependent data, the method
2. comprising:
3.   (a)   receiving data for transmission to a base station;
4.   (b)   determining whether the data is appropriate for transmission over a digital control
5.   channel;
6.   (c)   if the data is appropriate for transmission over a digital control channel,
7.   determining whether network conditions are favorable for transmission over a
8.   digital control channel; and
9.   (d)   if network conditions are favorable, transmitting the data over a digital control
10.   channel to the base station.

1. 4. The method of claim 3, further comprising the steps of:
2.   (e)   queuing the data for future transmission if network conditions are not favorable
3.   for transmitting the data; and
4.   (f)   repeating step (c) until network conditions are favorable for transmitting data.

1 5. The method of claim 4, wherein said determining whether the data is appropriate for

2   transmission over a digital control channel includes determining whether the data is less

3   than a predetermined size.

1 6. The method of claim 5, wherein conditions favorable for transmission include the

2   existence of a slot in the digital control channel into which the data can be placed for

3   transmission.

1 7. A method for wireless communication for non-latency-dependent data, the method

2   comprising:

3   (a) receiving data for transmission to a base station;

4   (b) determining whether the data is appropriate for transmission over a digital control

5   channel;

6   (c) if the data is appropriate for transmission over a digital control channel, queuing

7   the received data for transmission;

8   (c) monitoring network conditions for conditions favorable for transmission; and

9   (d) transmitting the data over a digital central channel when network conditions are

10   favorable for transmission.

1 8. The method of claim 7, wherein the conditions favorable for transmission include the

2   existence of a slot in the digital control channel into which the data can be placed for

3   transmission.

1 9. An apparatus for transmitting non-latency-dependent data over a wireless system, the

2 apparatus comprising:

3 (a) a processor; and

4 (b) a memory coupled to said processor, said memory storing instructions adapted to

5 be executed on said processor, the instructions including:

6 (i) receiving data for transmission to a base station;

7 (ii) determining whether the data is appropriate for transmission over a digital

8 control channel;

9 (iii) if the data is appropriate for transmission over a digital control channel,

10 determining whether network conditions are favorable for transmission

11 over a digital control channel; and

12 (iv) if network conditions are favorable, transmitting the data over a digital

13 control channel to the base station.

1 10. The apparatus of claim 9, said memory storing further instructions adapted to be executed

2 on said processor, said further instructions including:

3 (v) queuing the data for future transmission if network conditions are not

4 favorable for transmitting the data; and

5 (vi) repeating step (iii) until network conditions are favorable for transmitting

6 data.

1 11. The apparatus of claim 10, wherein said determining whether the data is appropriate for

2 transmission over a digital control channel includes determining whether the data is less

3 than a predetermined size.

1 12. The apparatus of claim 11, wherein conditions favorable for transmission include the

2 existence of a slot in the digital control channel into which the data can be placed for

3 transmission.

1 13. An apparatus for wireless communication for non-latency-dependent data, the apparatus

2 comprising:

3   (a)   a processor; and

4   (b)   a memory coupled to said processor, said memory storing instructions adapted to

5   be executed on said processor, said instructions including:

6   (i)   receiving data for transmission to a base station;

7   (ii)   determining whether the data is appropriate for transmission over a digital

8   control channel;

9   (iii)   if the data is appropriate for transmission over a digital control channel,

10   queuing the received data for transmission;

11   (iv)   monitoring network conditions for conditions favorable for transmission;

12   and

13   (v)   transmitting the data over a digital central channel when network

14   conditions are favorable for transmission.

1 14. The apparatus of claim 13, wherein the conditions favorable for transmission include the

2 existence of a slot in the digital control channel into which the data can be placed for

3 transmission.

1 15. A medium for wireless communication of non-latency-dependent data, the medium

2 storing instructions adapted to be executed on a processor, the instructions comprising:

3   (a)   receiving data for transmission to a base station;

4   (b)   determining whether the data is appropriate for transmission over a digital control

5   channel;

6   (c)   if the data is appropriate for transmission over a digital control channel,

7   determining whether network conditions are favorable for transmission over a

8   digital control channel; and

1 (d) if network conditions are favorable, transmitting the data over a digital control

2   channel to the base station.

1 16. The medium of claim 15, said medium storing further instructions adapted to be executed

2 on a processor, the further instructions comprising:

3 (e) queuing the data for future transmission if network conditions are not favorable

4   for transmitting the data; and

5 (f) repeating step (c) until network conditions are favorable for transmitting data.

1 17. The medium of claim 16, wherein said determining whether the data is appropriate for

2 transmission over a digital control channel includes determining whether the data is less

3 than a predetermined size.

1 18. The medium of claim 17, wherein medium conditions favorable for transmission include

2 the existence of a slot in the digital control channel into which the data can be placed for

3 transmission.

1 19. A medium for wireless communication for non-latency-dependent data, the medium

2 storing instructions adapted to be executed a processor, the instructions comprising:

3 (a) receiving data for transmission to a base station;

4 (b) determining whether the data is appropriate for transmission over a digital control

5   channel;

6 (c) if the data is appropriate for transmission over a digital control channel, queuing

7   the received data for transmission;

8 (c) monitoring network conditions for conditions favorable for transmission; and

9 (d) transmitting the data over a digital central channel when network conditions are

10   favorable for transmission.

1   20.   The medium of claim 19, wherein the conditions favorable for transmission include the

2   existence of a slot in the digital control channel into which the data can be placed for

3   transmission.

ABSTRACT

A method and apparatus for wireless communication for non-latency-dependent data comprises receiving data to be transmitted over a digital control channel. If the data is appropriate for transmission over the digital control channel, then the data is so transmitted if the network conditions are favorable for such a transmission. If network conditions are not favorable
5   for transmission over the digital control channel, then the data is queued for future transmission.
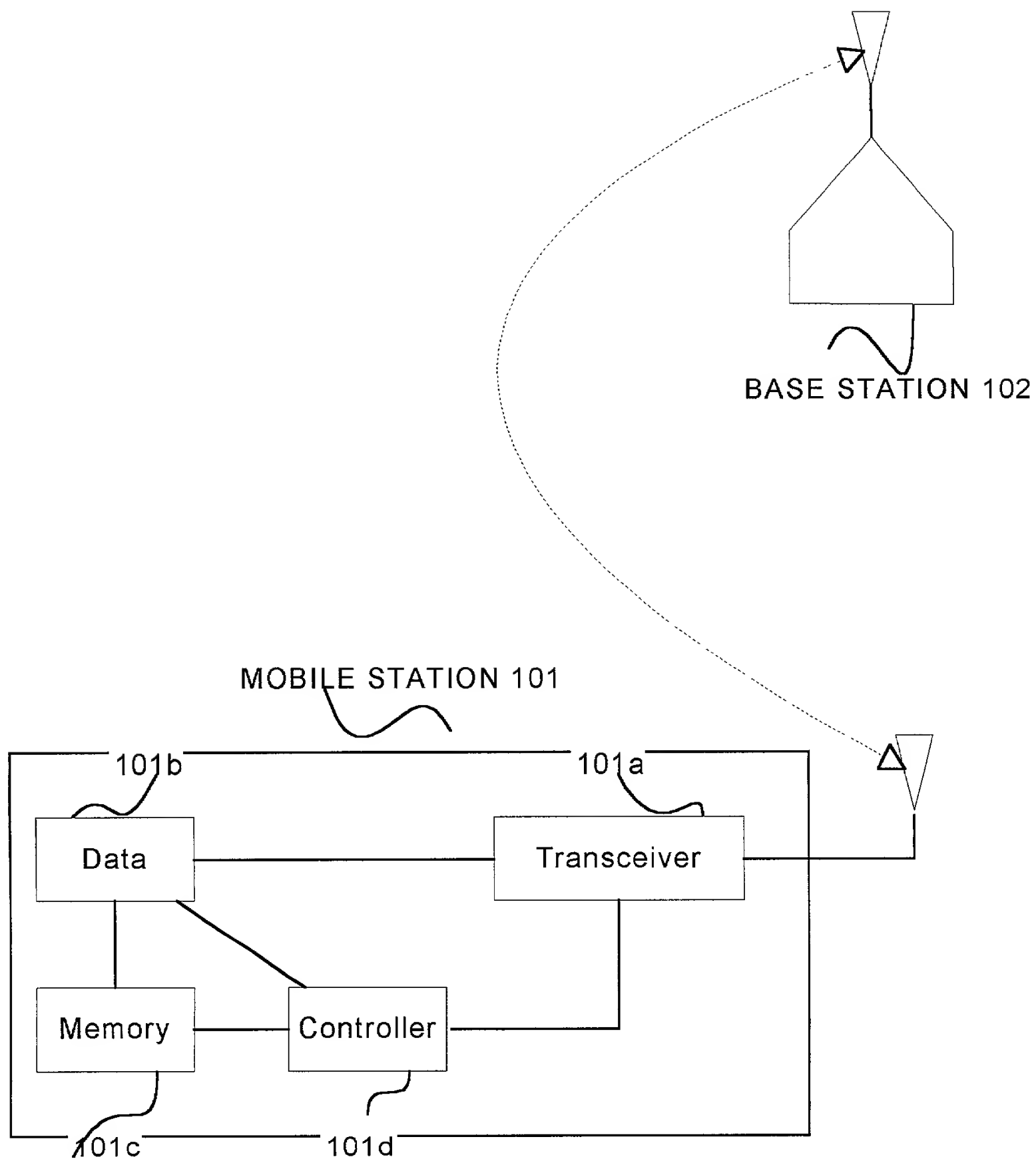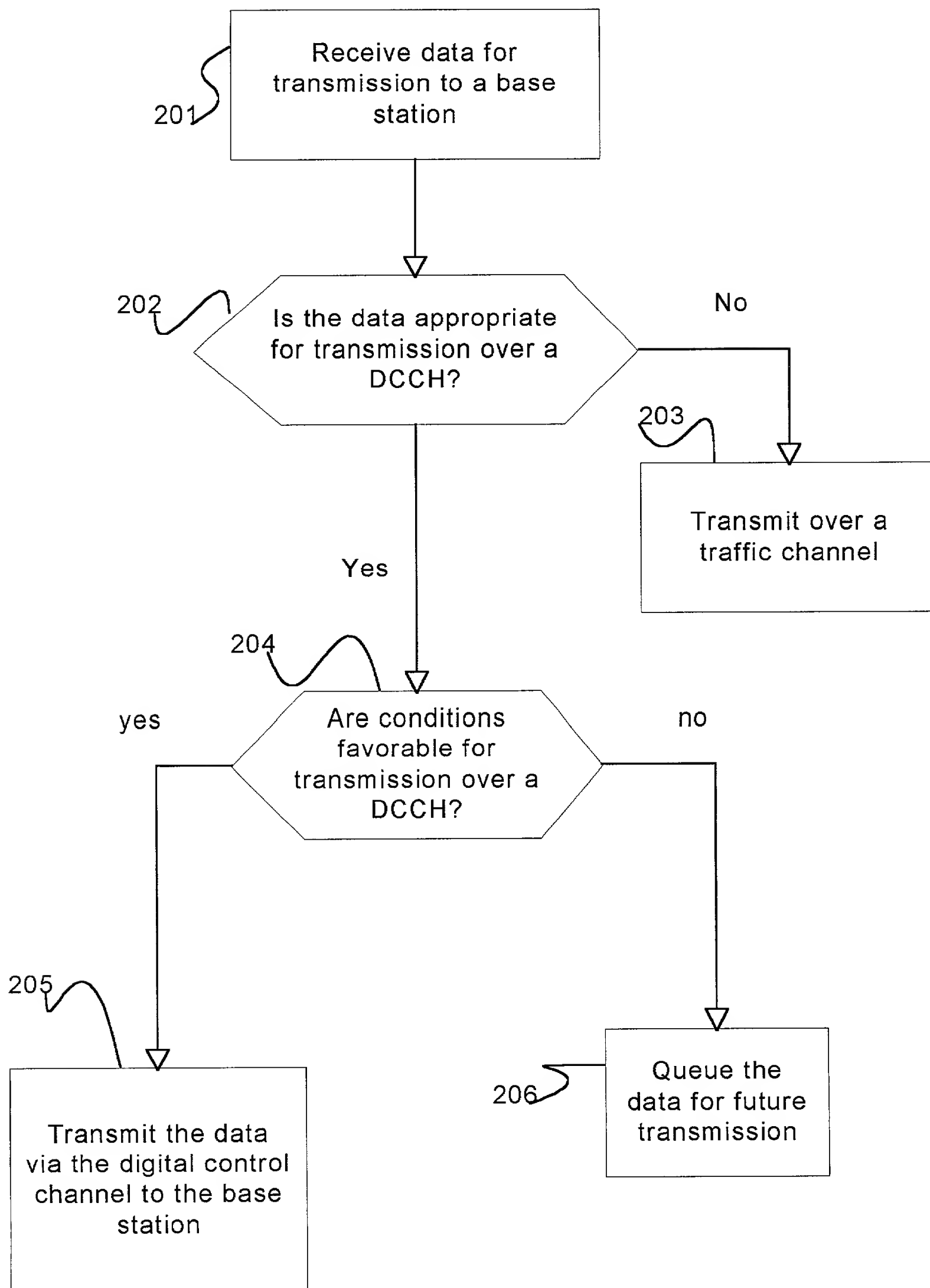
BASE STATION 102

MOBILE STATION 101

101b

101a

Data

Transceiver

Memory

Controller

101c

101d

FIGURE 1

Receive data for
transmission to a base
station

201

Is the data appropriate
for transmission over a
DCCH?

202

No

Transmit over a
traffic channel

203

Yes

Are conditions
favorable for
transmission over a
DCCH?

204

yes   no

Transmit the data
via the digital control
channel to the base
station

205

Queue the
data for future
transmission

206

FIGURE 2

PROCESSOR

301

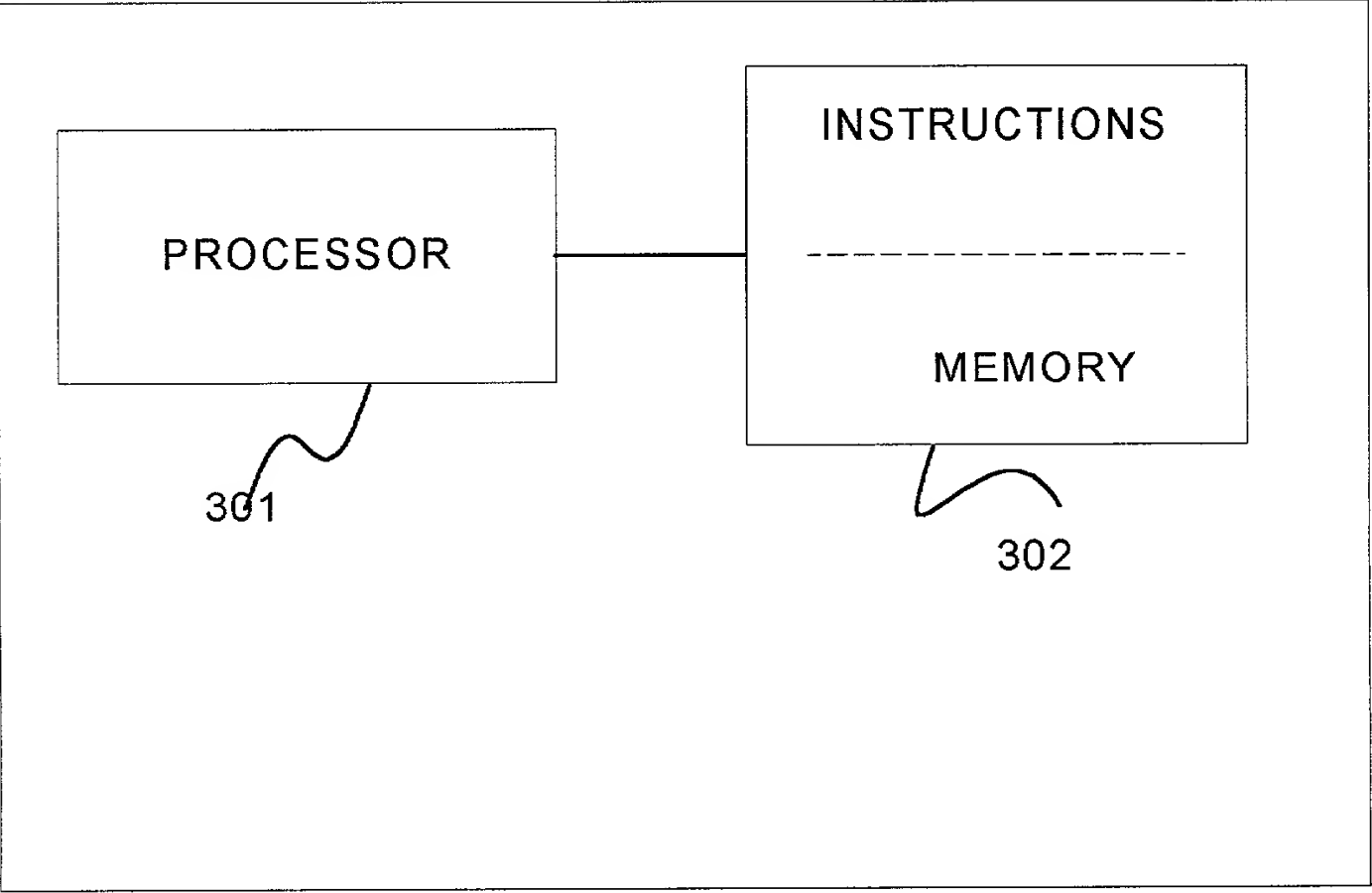INSTRUCTIONS

- - - - - - - - - - - - -

MEMORY

302

FIGURE 3

IN THE UNITED STATES
PATENT AND TRADEMARK OFFICE

Declaration and Power of Attorney

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am an original, first and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled **System And Method For Outbox-Capable Wireless Transmission,** the specification of which is attached hereto.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by an amendment, if any, specifically referred to in this oath or declaration.

I acknowledge the duty to disclose all information known to me which is material to patentability as defined in Title 37, Code of Federal Regulations, 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, 119 of any foreign application(s) for patent or inventors' certificate listed below and have also identified below any foreign application for patent or inventors' certificate having a filing date before that of the application on which priority is claimed:

None

I hereby claim the benefit under Title 35, United States Code, 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, 112, we acknowledge the duty to disclose all information known to us to be material to patentability as defined in Title 37, Code of Federal Regulations, 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

None

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

I hereby appoint the following attorney(s) with full power of substitution and revocation, to prosecute said application, to make alterations and amendments therein, to receive the patent, and to transact all business in the Patent and Trademark Office connected therewith:

Samuel H. Dworetsky	(Reg. No. 27873)
Thomas A. Restaino	(Reg. No. 33444)
Jose de la Rosa	(Reg. No. 34810)
Michele L. Conover	(Reg. No.34962)
Robert B. Levy	(Reg. No. 28234)
Benjamin S. Lee	(Reg. No. 42787)
Alfred G. Steinmetz	(Reg. No. 22971)

I also appoint Frank Pietrantonio (Reg. No. 32289) and Stuart D. Smolen (Reg. No. 42161) of Kenyon & Kenyon as associate attorneys, with full power to prosecute said application, to make alterations and amendments therein, and to transact all business in the Patent and Trademark Office connected therewith.

Please address all correspondence to Mr. S. H. Dworetsky, AT&T Corp., P.O. Box 4110, Middletown, New Jersey 07748. Telephone calls should be made to Samuel H. Dworetsky at 973-360-8120.

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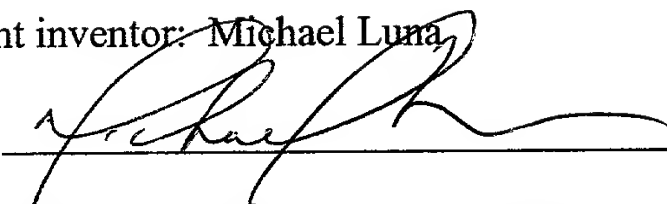Inventor's signature _William Patrick Coan_ Date 6/7/99

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